

Digital Acquisition and Wavelength Control of Seed Laser for Space-Based LIDAR Applications, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



ABSTRACT

This SBIR Phase II proposes the development and delivery of a compact, space qualifiable, diode-based seed laser system that utilizes a digital controller to allow autonomous acquisition of lock to the required wavelength in remote environments for multi-wavelength flight and space-based lidar applications. Successful development of this technology, due to its compact, efficient, and reliable design, is an important step towards enabling deployment of future space-based high spectral resolution lidar (HSRL) systems for remote sensing systems, as well as improving the autonomous performance of deployed and developing ground and flight-based HSRL systems.

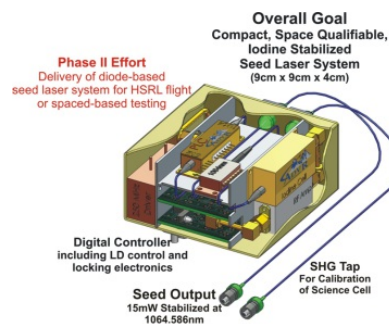
ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: The primary customer is NASA Langley's High Spectral Resolution Lidar (HSRL) program for aerosol and cloud characterization. This system is being considered for the ACE lidar by NASA's ACE Science Working Group because of the higher information content it provides over backscatter lidar on key aerosol optical and microphysical properties. The proposed technology will find multiple uses in other NASA's lidar remote sensing programs, such in altimetry, DIAL lidar, and 3D WINDS where compact, low cost, stabilized single frequency laser sources are required, and also has potential application in spectroscopic measurement techniques.

To the commercial space industry:

Potential Non-NASA Commercial Applications: In addition to NASA's use in various lidar systems, a digitally controlled, compact, low cost, wavelength stabilized, diode-based seed source can also be applied for systems requiring high frequency stability, such as long path difference interferometry, holography, spectroscopy, and metrology. A compact frequency stabilized seed laser source may find use in fiber and free-space

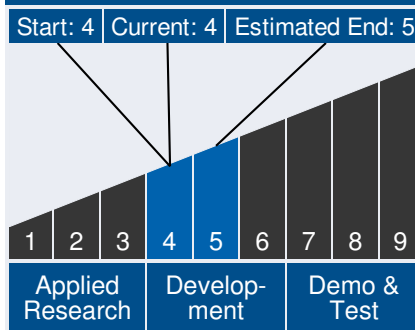


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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

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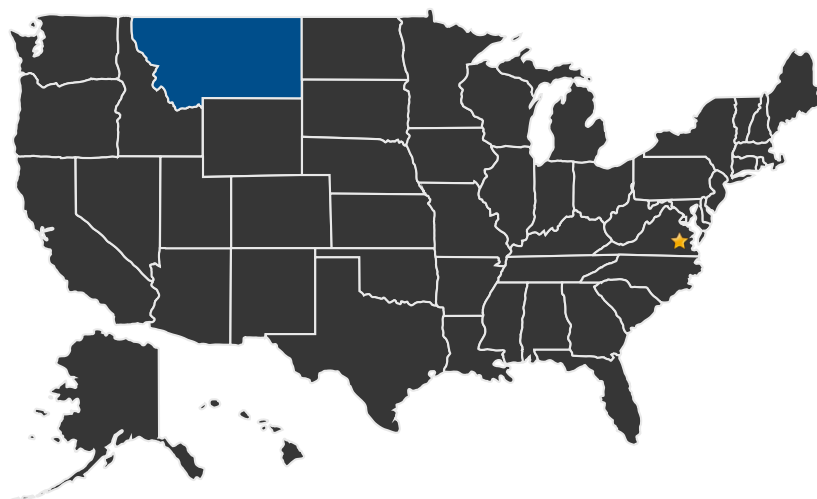
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communications where rapid, moderate power phase modulation is required. Medical applications that may benefit from this technology include medical imaging and phase-modulation fluorimetry in bioprocess and clinical monitoring. A number of commercial lidar or lidar-like systems will benefit from the insertion of this technology, including environmental and pollution monitoring, floodplain measurement, land use assessment, bathymetry, robotics and machine vision applications.

U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ **Lead Center:**
Langley Research Center

Other Organizations Performing Work:

- ADVR, Inc. (Bozeman, MT)

PROJECT LIBRARY

Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/17833>)

Management Team (cont.)

Program Manager:

- Carlos Torrez

Principal Investigator:

- Shirley McNeil

Technology Areas

Primary Technology Area:

Science Instruments,
Observatories, and Sensor
Systems (TA 8)

- └ Remote Sensing Instruments
and Sensors (TA 8.1)
 - └ Lasers (TA 8.1.5)
 - └ Seed Laser (TA
8.1.5.6)

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DETAILS FOR TECHNOLOGY 1

Technology Title

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